

```
% Find approximation to the first derivatives of the functions  $f(x)=(x-1)^3$   
% and  $g(x)=\sin(5x)(x-1)^3$  using the forward, backward and central  
% differences.
```

```
clc;  
clear all;
```

```
F_1 = @(x) sin(5*x).*power(x-1,2);  
G_1 = @(x) power(x-1,3);  
x=linspace(-1,1,200);  
F=F_1(x);  
G=G_1(x);
```

```
h=x(2)-x(1);  
xCentral=x(2:end-1);  
dFCentral=(F(3:end)-F(1:end-2))/(2*h);  
dGCentral=(G(3:end)-G(1:end-2))/(2*h);  
xForward=x(1:end-1);  
dFForward=(F(2:end)-F(1:end-1))/h;  
dGForward=(G(2:end)-G(1:end-1))/h;  
xBackward=x(2:end);  
dFBackward=(F(2:end)-F(1:end-1))/h;  
dGBackward=(G(2:end)-G(1:end-1))/h;  
hold on  
tiledlayout(3,2);  
nexttile  
plot(xCentral,dFCentral,'r')  
legend('F-Central')  
nexttile  
plot(xForward,dFForward,'k');  
legend('F-Forward')  
nexttile  
plot(xBackward,dFBackward,'g');  
legend('F-Backward')  
nexttile  
plot(xCentral,dGCentral,'b')  
legend('G-Central')  
nexttile  
plot(xForward,dGForward,'c');  
legend('G-Forward')  
nexttile  
plot(xBackward,dGBackward,'m');  
legend('G-Backward')
```